

Claims

- [c1] 1. A device for mixing medical fluids, said device comprising
an inlet port for receiving at least a first medical fluid,
an injection port for injection of a second medical fluid,
an outlet port for exit of a mixed flow of said first and second medical fluids,
a first duct extending between said injection port and said inlet port, and
a second duct extending between said inlet port and said outlet port,
said injection port being sealed by a fluid-proof membrane which can be
penetrated by an injection needle when injecting said second medical fluid,
at least a first portion made of a first material and a second portion made of a
second material, wherein said second material is substantially more resilient
than said first material, and said inlet port and said injection port are included
in said first portion and said outlet port is included in said second portion
wherein said first and second portions are attached to each other by means of a
combined friction coupling and snap connection providing a first retention
force.
- [c2] 2. The device according to claim 1, said first portion further comprising an
annular, tapering groove and said second portion further comprising an
annular, tapering rim, said first portion comprising a first snap member and
said second portion comprising a second snap member,
wherein said groove is designed and arranged for snugly accommodating said
rim in order to provide part of said first retention force, and
wherein said first snap member is designed and arranged for interacting with
said second snap member in order to provide the remainder of said first
retention force.
- [c3] 3. The device according to claim 1, said outlet port further comprising a tube of
said resilient second material, wherein said tube is designed and arranged for
snugly accommodating a piercing member of an infusion line in order to retain
said piercing member with a second retention force.
- [c4] 4. The device according to claim 1, said outlet port further comprising a tube of
said resilient second material, said tube having a first diameter at a first end

facing towards said first portion and a second diameter at a second end facing towards said outlet port wherein said tube is designed and arranged with said second diameter being smaller than said first diameter in order to allow leakage-proof insertion of a piercing member of an infusion line.

[c5] 5. The device according to claim 1, said first portion further comprising an annular, tapering groove, said second portion further comprising an annular, tapering rim, and said outlet port further comprising a tube of said resilient second material, wherein said groove is designed and arranged for retaining said rim with a first retention force and said tube is designed and arranged for retaining a piercing member of an infusion line with a second retention force in such a way that said first and second retention forces both are larger than 15 N in 30 seconds and said first retention force is larger than said second retention force.

[c6] 6. The device according to claim 1, wherein said outlet port is sealed by a barrier member which is designed and arranged to be ruptured by a piercing member of an infusion line in order to open a passage for said mixed flow from said inlet port to said outlet port

[c7] 7. The device according to claim 1, wherein said first portion has been injection-molded from a thermoplastic polymer material.

[c8] 8. The device according to claim 1, wherein said first portion is made of polypropylene, polycarbonate or ABS-polymer.

[c9] 9. The device according to claim 1, wherein said second portion is made of an elastomeric polymer material or a synthetic rubber material.

[c10] 10. The device according to claim 1, said inlet port further comprising a rigid spike member for penetrating a fluid-proof septum of a fluid container containing said first medical fluid.

[c11] 11. The device according to claim 1, said first portion further comprising a locking member for permanent coupling to a fluid transfer port of a fluid container containing said first medical fluid.

- [c12] 12. The device according to claim 1, said inlet port further comprising a rigid spike member having at least one barb member for engaging an internal surface of a fluid transfer port of a fluid container containing said first medical fluid.
- [c13] 13. The device according to claim 1, said inlet port further comprising a rigid spike member having at least one hook member for engaging an external surface of a fluid transfer port of a fluid container containing said first medical fluid.
- [c14] 14. The device according to claim 1, said outlet port being sealed by a barrier member which is integrated with and made of the same material as said outlet port.
- [c15] 15. The device according to claim 1, wherein said outlet port is sealed by a barrier member which is designed and arranged to be ruptured by a piercing member of an additional spike member in order to enable passage of said mixed flow from said Inlet port via said second duct through said additional spike member into an infusion line.
- [c16] 16. The device according to claim 1, wherein said fluid-proof membrane of said injection port is designed and arranged to be penetrated by said injection needle, wherein said injection needle is provided by a fluid transfer device which can be connected to a second medical fluid-reservoir at one end and which exhibits an additional fluid-proof membrane at the other end which is designed and arranged to be included in a double-membrane bayonet coupling with said injection port.
- [c17] 17. The device according to claim 1, characterized in that the device exhibits a base member for allowing the device to rest in a horizontal position before infusion.
- [c18] 18. The device according to claim 1, said device further comprising a handle grip for facilitating connection of said device to a fluid container.
- [c19] 19. The device according to claim 1, said second portion further comprising a cap member for preventing contamination which can be opened in order to

access said outlet port.

- [c20] 20. The device according to claim 1, wherein said device has less than five components attached to each other.
- [c21] 21. The device according to claim 1, said device only comprising said fluid-proof membrane, said first portion, said second portion, and a removable hood for preventing contamination of said inlet port.
- [c22] 22. The device according to claim 1, wherein said second portion of said device is attached to a drip chamber of an infusion line
- [c23] 23. A method for enabling mixing of medical fluids, said method comprising the steps of:
providing a mixing device exhibiting an inlet port, an injection port and an outlet port,
coupling said inlet port to a fluid transfer port of a fluid container containing a first medical fluid,
connecting a fluid transfer device having an injection needle to said injection port by means of a double-membrane bayonet coupling, penetrating fluid-proof membranes included in said double-membrane bayonet coupling by means of said injection needle,
injecting a second medical fluid from a second medical fluid-reservoir connected to said fluid transfer device into said first medical fluid,
passing a mixed flow of said first and second medical fluids through said outlet port into an infusion line, and
providing a combined friction coupling and snap connection in said device between a first portion which is made of a first material and exhibits said inlet port and said injection port and a second portion which is made of a second material being substantially more resilient than said first material and which exhibits said outlet port.
- [c24] 24. The method according to claim 23, the method further comprising the step of:
inserting an annular, tapering rim of said second portion into an annular,

tapering groove of said first portion in order to achieve a snug fit providing a friction coupling between said first and second portions.

[c25] 25. The method according to claim 23, the method further comprising the step of:

introducing a male snap member into a female snap member in order create a snap connection between said first and second portions.

[c26] 26. The method according to claim 23, the method further comprising the step of:

insert a piercing member of said infusion line into a tube of said second portion in order to achieve a snug fit.

[c27] 27. The method according to claim 23, the method further comprising the step of:

providing said second portion exhibiting a tube having a first diameter at a first end facing towards said first portion and a second diameter at a second end facing towards said outlet port,
selecting said second diameter to be smaller than said first diameter, and
inserting a piercing member of said infusion line into said tube from said second end.

[c28] 28. The method according to claim 23, the method further comprising the step of:

creating a first retention force between an annular, tapering groove of said first portion and an annular, tapering rim of said second portion,
creating a second retention force between a tube of said second portion and a piercing member of an infusion line, and
selecting said first and second retention forces to be larger that 15 N in 30 seconds and said first retention force to be larger than said second retention force.

[c29] 29. The method according to claim 2, the method further comprising the step of:

rupturing a barrier member sealing said outlet port by means of a piercing

member of an infusion line.

[c30] 30. The method according to claim 23, the method further comprising the step of:

providing the first portion as an injection-molded component made of a thermoplastic polymer material.

[c31] 31. The method according to claim 23, the method further comprising the step of:

providing the first portion as a component made of polypropylene, polycarbonate or ABS-polymer.

[c32] 32. The method according to claim 23, the method further comprising the step of:

designing the second portion as a component made of an elastomeric polymer material or a synthetic rubber material.

[c33] 33. The method according to claim 23, the method further comprising the step of:

designing the inlet port as a rigid spike member and to penetrate a fluid-proof septum of a fluid container containing said first medical fluid by means of said spike member.

[c34] 34. The method according to claim 23, the method further comprising the step of:

utilizing a locking member provided on said first portion in order to achieve a permanent coupling to a fluid transfer port of a fluid container containing said first medical fluid.

[c35] 35. The method according to claim 23, the method further comprising the step of:

engaging an internal surface of a fluid transfer port of a fluid container containing said first medical fluid by means of at least one barb member of a rigid spike member of said inlet port.

[c36] 36. The method according to claim 23, the method further comprising the step

of:

engaging an external surface of a fluid transfer port of a fluid container containing said first medical fluid by means of at least one hook member of a rigid spike member of said inlet port.

[c37] 37. The method according to claim 23, the method further comprising the step of:
providing the outlet port with an integrated barrier member made of the same material as said outlet port.

[c38] 38. The method according to claim 23, the method further comprising the step of:
providing the outlet port with a barrier member, and to rupture said barrier member by means of a piercing member in form of an additional spike member of said infusion line.

[c39] 39. The method according to claim 23, the method further comprising the step of:
resting the device in a horizontal position on a base member of said device.

[c40] 40. The method according to claim 23, the method further comprising the step of:
handling said device by means of a handle grip when connecting said device to a fluid container.

[c41] 41. The method according to claim 23, the method further comprising the step of:
opening a contamination-preventing cap member of said device in order to access said outlet port.

[c42] 42. The method according to claim 23, the method further comprising the step of:
assembling less than five components before using said device.

[c43] 43. The method according to claim 23, the method further comprising the step of:

assembling the device only from said fluid-proof membrane, said first portion, said second portion and a removable hood for preventing contamination of said inlet port.

[c44] 44. The method according to claim 25, the method further comprising the step of:
removing a contamination-preventing hood from said inlet port before using said device.

[c45] 45. The method according to claim 25, the method further comprising the step of:
providing said second portion with a drip chamber attached thereto.

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